

honourable position in our curriculum. At other schools, as, for example, the Manchester Grammar School, I am told that even a larger proportion of the time of the boys is given to work of this kind; and on the whole I am inclined to think that, notwithstanding the reluctance of some of the old foundations to admit the interloper, yet that the prospects of science in connection with general education are exceedingly satisfactory and encouraging.

It would be a mistake to attempt to *displace* classical studies, as some people seem to wish, in favour of science or any other subject. It cannot be expected that all boys should have the same tastes or capabilities. It would be as much an error to compel a boy, who has shown no aptitude for science, to devote any large proportion of his time to that subject, when he might be getting on with his classics, as it would be to doom another to Latin prose when his heart was all the time in the laboratory. The true system I believe to be this. After passing through a junior school, in which all should be equally instructed in some branch of natural history or experimental science, boys should then be drafted off into one of three departments. There should be (1) a classical school, in which Latin and Greek should be the staple, though not to the exclusion of a certain modicum of mathematics and science; (2) a modern school, in which mathematics are predominant; and (3) a science school, in which languages, though subordinate to science, should not be altogether extinguished. This is very nearly the system pursued at Clifton, and I can testify to its practical convenience and success.

As regards the choice of subjects, though I believe chemistry is pre-eminent in its capacity for developing certain of the mental powers, I consider that the fullest advantage is not derived from it, unless it is taught in a certain way. I hold that teachers of chemistry in schools are wrong when they set about teaching boys according to the methods commonly in use in the instruction of ordinary chemical students. The latter have to apply their knowledge to practical purposes, and this is not the prime object to be kept in view in determining the educational value of a given subject.

And this leads me back to the question of examination papers. I consider that examiners have as much to learn as teachers in connection with their respective functions. At present it is too frequently, "How do you make this?" or, "What are the properties of that?" a style of question which is good enough in its way, but to answer requires very little intellectual effort. The preparation for such an examination is little better than "cram," and is of proportionately small educational value.

If examiners, whether in school or university, would take more pains in framing their questions so as to extract not alone that which is in the memory of the candidate, but to get the product of his brain, I believe great and important service would be rendered to scientific education.

WILLIAM A. TILDEN

Clifton College, Bristol, March 6

PRINCIPAL CHARACTERS OF THE DINOCERATA

UNDER the above title, Prof. O. C. Marsh, of Yale College, has published several facts of great importance with reference to the structure of the huge Eocene Mammals of Wyoming, of which we have already given a short description (NATURE, vol. vii. p. 366) from the same author's memoirs.

We now learn that the brain as known from the inside of the skull was very remarkable, being proportionately smaller than in any other known mammal, the *Spermaceti* and some other whales alone excepted. In *Dinoceras mirabilis* the entire brain was not greater in any of its transverse dimensions than the spinal canal in the

cervical region. Its relative size and position can be best estimated from the accompanying drawing, copied from one given by Prof. Marsh, the brain in it being shaded, with a portion of the spinal cord attached. From the figure it is also evident that the olfactory lobes are proportionately large, at the same time that the cerebral lobes are hardly bigger than in some reptiles. The cerebellum must also have been small, whilst the cranial as well as the spinal nerves and the cord were immense.

The teeth are figured with their prominent V-shaped ridges, the dental formula being given as:—

$$\frac{i}{3} \frac{c}{3} \frac{\frac{1}{1}}{1} \frac{p}{3} \frac{m}{3} \frac{\frac{2}{3}}{3} \frac{m}{3} \frac{\frac{2}{3}}{3} \times 2 = 34.$$

The upper canines were very long and pointed, and peculiar expanded descending processes on either side of the lower jaw seem to have acted as guards to protect them whilst the mouth was closed. The condyles of the lower jaw were transverse, and therefore only allowed of an up-and-down movement. The molars were peculiarly small for the size of the animal and of the skull. The creature must have been carnivorous, as mastication could only have been slight, and the food therefore nutritious.

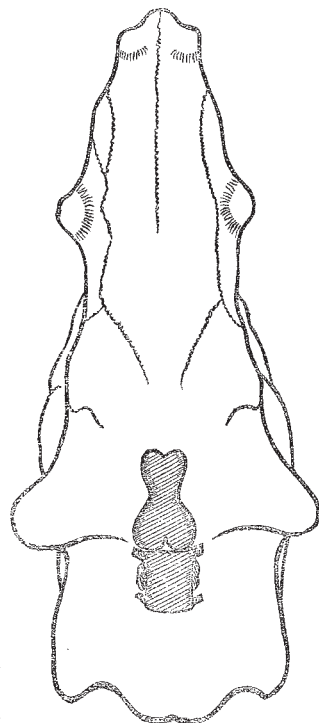
The feet are figured. They were very elephantine, there being five digits on each; these, with the carpus and tarsus, being short and compressed from above downwards. The terminal phalanges were well developed. The other bones much resembled those of the elephant in size as well as contour. Prof. Marsh tells us that the head could evidently reach the ground, and that there is no evidence of a proboscis.

These characters all point to the fact that in Eocene times there lived an order of animals which have no representatives at the present day, and that they were highly specialised in some points of their structure, whilst in others they were equally ill-developed.

NOTES

WE learn that a scheme is on foot for a memorial of the late Prof. Rankine. Students of Thermodynamics, Engineering, &c., will be doubly delighted to hear that the memorial is to take the form of an edition, in two handsome quarto volumes, of his valuable papers contributed to the various scientific societies and magazines.

A SERIES of lectures upon zoological subjects will be delivered after Easter in the Zoological Society's Gardens, in Regent's Park, on Thursdays, at 5 P.M. The following are the titles, together with the days on which they will be delivered by the respective lecturers:—April 27, Mr. P. L. Sclater, F.R.S., on the Society's Gardens and their inhabitants; May 4, Prof. Flower, F.R.S., Rhinoceroses and Tapirs; May 11, Prof. Flower, Horses and Zebras; May 18, Dr. J. Murie, the Manatee; May 25, Prof. Garrod, On Birds; June 1, Prof. Mivart, On Bats; June 8, Mr. Tegetmeier, On Homing Pigeons;



June 15, Prof. Garrod, on Reptiles; Mr. J. W. Clark, on the Beaver and its distribution; June 29, Dr. Carpenter, on the Zoological Station at Naples.

WE are in a position to state that M. Leverrier has not accepted a seat in the Berlin Academy of Sciences, as was announced recently in a London daily paper. He would have been present at the meeting of the Royal Astronomical Society, to receive his medal, had he not been prevented by ill-health. Although not serious, the illness was sufficient to keep him at home for a protracted period.

WE have received the *Atlas Météorologique de l'Observatoire de Paris* for the years 1872, 1873, and 1874, which has been prepared from documents received and discussed by the Departmental Meteorological Commissions, the normal schools, the observers, and others, and published with the concurrence of the Scientific Association of France. This very valuable publication, giving in detail results of much of the important meteorological work now undertaken by France, together with separate discussions on inquiries of great interest by such writers as Prof. Raulin, MM. E. Belgrand, G. Lenoire, and Brault, we shall take an early opportunity of more fully bringing before our readers.

A DAILY weather report, by the *Deutsche Seewarte*, began to be issued at Hamburg under the direction of Dr. G. Neumayer, on 1st January last, which shows on one map embracing nearly the whole of Europe, the distribution of pressure, wind, and cloud, and on another, temperature, rainfall, and sea disturbance, along with a general review of the state of the weather in the morning, the changes that have occurred since the afternoon of the day before, and occasionally a forecast of the weather to be expected. The reports are based on weather telegrams received from twenty-seven places situated in different parts of Germany, supplemented by reports from Great Britain, France, Italy, Austria, Russia, Denmark, Sweden, and Norway. The report is a valuable addition to the daily weather maps of Europe, and considering the great ability of Dr. Neumayer and his coadjutors, the system will be most efficiently worked.

WE have received from the South Australian Institute, Adelaide, six valuable meteorological diagrams, representing the main facts of the rainfall at Adelaide from January 1839 to October 1874, at Melbourne from January 1855 to July 1874, and at Sydney from April 1840 to July 1874. The diagrams for Adelaide are particularly full, showing the rainfall each day for the thirty-five years, the annual amounts, and the monthly averages and extremes.

THE Central Committee for the participation of Germany in the forthcoming Exhibition of Scientific Apparatus has up to the present admitted 260 applicants, who will exhibit altogether 2,300 instruments. The British Government has afforded every facility to the exhibitors, having sent specially-fitted carriages to Berlin for the safe conveyance of instruments of great value.

AT a recent meeting of the Sedgwick Memorial Committee at Cambridge, the treasurer announced that the fund amounted to 11,500*l*. This sum is, however, insufficient for the purpose of erecting a Museum worthy as a building to commemorate the late Professor, and it is hoped that additional subscriptions will still be forthcoming. It is intended that the Museum should form part of a group of buildings for Natural Science purposes. The whole question is under the consideration of a Syndicate.

AT a meeting of the Senatus Academicus of Aberdeen University, held on Saturday, it was resolved to confer the degree of LL.D. upon Mr. Charles Meldrum, the Observatory, Port Louis, Mauritius, and Mr. John Smith, Professor of Chemistry, University of Sydney,

A CROWDED meeting was held by the Italian Geographical Society on Tuesday morning in one of the large halls of the Collegio Romano for the purpose of taking leave of the Marchese Antinori, Signor Chiarini, Professor of Geology, and Capt. Martini, composing the expedition sent out to Central Africa. The President, Commendatore Correnti, ex-Minister of Public Instruction, addressed the meeting. Among the many distinguished persons present were Prince Humbert, Honorary President, and General Menabrea, member of the Council of the Society. In the evening a banquet was given to the members of the expedition, and yesterday they were to embark at Naples direct for Aden.

THE *Times* Berlin correspondent writes that Capt. Sosnovski, the Russian traveller, who has just threaded his way from the shores of China to the South Siberian frontier, has presented to his Government an explicit report upon new caravan roads to be formed through Mongolia.

M. GREARD, the Director of Public Instruction of the City of Paris, has just published his Reports, which contain a great number of interesting facts. In 1861, 48 children in each 100 were educated in the public schools of the city; in 1872 the proportion was 68 per cent.; but out of the remaining 32 per cent. only 20 per cent. are uneducated, the other 12 being educated in their families or in private institutions. The fact is all the more noteworthy that in the department of the Seine or suburban Paris, the number of schools and of pupils is diminishing. This is attributed to the impoverishment and sufferings resulting from the German and civil wars, which fell more heavily on the suburbs than on Paris itself.

M. ANSART, a captain in the French navy, has published, under the title "Anemology," an interesting article on the formation of winds, in the *Revue Maritime et Coloniale* for December. The principal aim of the author is to prove that the electrical attraction exerted on the clouds by the earth is an important factor in the generation of winds; the motions of the air being thus not merely dynamical as is generally supposed. Capt. Ansart is not the only meteorologist who has tried to take account of the electrical power of the earth. At the end of his essay he quotes the opinion published by M. Keller, who explains by attraction of the earth the production of waterspouts. He concurs in opinion with Capt. Ansart that the matter of the clouds under special circumstances is attracted by the negative electricity of the earth being strongly positively electrified. The rotation of a waterspout, according to Capt. Ansart, is caused by the attraction of the earth not being equally exerted on the whole of the surface of the cloud.

THE *Augsburg Gazette* states that the number of students registered in Berlin, of German nationality, is 1,884, in Leipzig 2,575, and in Munich, 1,087.

EARTHQUAKE shocks were felt in the province of Constantine, Algeria, at Philippeville and Giggelly, two sea-ports, on the night of Feb. 22-23. The exact times for Philippville were 1 and 1.30 A.M.; the direction north-west to south-east. Another motion was felt at Giggelly on the 23rd, at 4 o'clock in the afternoon. M. Bulard, Director of the Observatory of Algiers, expected other shocks on the 4th or 5th of March, and has published the prediction in the *Moniteur de l'Algérie*.

MESSRS. HENRY S. KING and Co., inform us that it was by an inadvertence that Bernstein's "Five Senses of Man" was advertised as ready; it will not be out for at least a fortnight.

WE have just received the first number of the Italian *Giornale del Museo d'Istruzione e di Educazione*, containing forty pages of valuable matter connected with various departments of education. The Museum of which this journal is the organ, was founded

at Rome by decree of Victor Emmanuel in 1874, and is probably one of the finest and most complete educational museums in the world. It is freely open to the public, and teachers have ample facilities for taking advantage of its circulating library, and of the various other means which it possesses for furthering the cause of higher education.

A NEW French geographical journal has been established by M. George Renaud, a member of the Paris Geographical Society, under the name of the *Journal Géographique Internationale*, which will be published twice a month. Each number will contain a coloured map.

MR. CUNLIFFE OWEN, the director of the South Kensington Museum, visited on Saturday last the photographic workroom established in the *Moniteur* office, Quai Voltaire, Paris. The peculiarity of the process used is the reproduction of colours by a series of chromo-printings. It is a combination of photography and chromo-lithography, which gives astonishing results, chiefly in the reproduction of models of engines and *natures mortes*.

THE March part of the *Geographical Magazine* contains two maps by Mr. Ravenstein, in connection with Lieut. Cameron's recently-accomplished journey across Africa. One of these is of a portion of South Africa, illustrative of Cameron's route from Lake Tanganyika to the west coast, and the other is a map of the country between Lake Tanganyika and Nyangwe, according to Livingstone and Cameron. The same number contains an interesting account by Lieut. Liardet of an ascent to the lake on the summit of the island of Taruni, in Fiji.

"THE Study of Natural Science" is the title of an address delivered to the Natural Science Classes in the University College of Wales, by Mr. F. W. Rudler, F.G.S., recently appointed Professor of Natural Science in the College. Mr. Rudler has sound notions as to the relations which ought to subsist between scientific and literary training in education, and of the methods which ought to be followed in the study of science.

WE have received a copy of the rules, list of members, and Papers read before the Cambridge Natural Science Club. The number of members is very limited, and the rules are sufficiently stringent to exclude all but men who mean to work. Some of the papers which have been read are of permanent value.

WE are glad to see that the Edinburgh Naturalists' Field Club, founded in 1869, is still in existence and evidently in a prosperous condition.

FROM its Tenth Annual Report, we are glad to learn that the North Staffordshire Naturalists' Field Club is in a prosperous condition; the number of members is now 330. The excursions and meetings during the past year appear to have been instructive and interesting. The Report contains the Annual Address of the President, Mr. C. Lynam, on the Sepulchral Monuments of Staffordshire. Other papers are: "The Geology of Needwood Forest," by Mr. W. Molyneux, F.G.S.; "Uriconium," by the Rev. J. S. Broad; "Ancient Church Bells in Staffordshire," by Mr. C. Lynam; and "Structural Features of Plants in relation to their uses in the Arts and in Medicine," by D. J. T. Arlidge.

PART 3 of Vol. I. of the *Transactions* of the Watford Natural History Society contains the following papers:—On the Botanical Work of the past Season, by R. A. Pryor, F.L.S., with a map of Hertfordshire; List of Works on the Geology of Hertfordshire, by W. Whitaker, F.G.S.; and A Few Words about some Local Ferns, by J. E. Littleboy.

IN the last-issued part of the *Transactions* of the Institution of Engineers and Shipbuilders in Scotland is a paper by

Mr. James Brownlee "On the Action of Water and Frictional Resistance or Loss of Energy when flowing at various velocities through a nozzle with a converging entrance and diverging outlet," with two plates.

THE President and Fellows of Magdalen College, Oxford, have commenced free courses of lectures on botany, zoology, and chemical physics, for artisans resident in Oxford. They will be continued throughout the present and Easter Term and the Long Vacation on each Saturday evening. The lectures are conducted by Prof. Lawson and Messrs. Chapman and Yule.

MESSRS. LEWIS AND CUNNINGHAME, special assistants to the Sanitary Commissioners with the Government of India, have just published a Report describing a series of important observations on the Soil in its relation to Disease.

"LIST of Hemiptera of the Region West of the Mississippi River" (extracted from the *Bulletin of the Geological and Geographical Survey of the Territories*, No. 5, second series, Washington, January, 1876) is the title of a pamphlet by Prof. P. R. Uhler, who has thus added one to the many valuable hand-lists now being published in various parts of the United States. The need of monographs and synonymic lists in the present day is constantly making itself felt; without them the entomologist can scarcely keep pace with the rapid growth of his study; so that he hails the appearance of such a paper as the above, with its well-executed and clearly-defined plates, as a godsend, for which he can hardly be too grateful.

THE additions to the Zoological Society's Gardens during the past week include a Brown Monkey (*Macacus brunneus*) from Siam, presented by Mr. Thos. G. F. Hesketh; a Tyrant Eagle (*Spizaetus tyrannus*) from South America, a Many-zoned Hawk (*Melierax polyzonus*) from East Africa, two Brazilian Caracaras (*Polyborus brasiliensis*), white variety, from Patagonia, presented by Lord Lilford; two Common Pintails (*Dasila acuta*), three Spotted-billed Ducks (*Anas pacificorhyncha*), eighteen Red-crested Whistling Ducks (*Fuligula rufina*) from North-west India, presented by Mr. E. C. Buck; a Ring-necked Parrakeet (*Palæornis torquata*) from India, presented by Mrs. Henry Kingston; a Cape Dove (*Ena capensis*) from Africa, presented by Miss Barrer; an Indian Elephant (*Elephas indicus*), a Secretary Vulture (*Serpentarius reptilivorus*) from South Africa, deposited; a Greenland Falcon (*Falco candicans*) from Greenland, purchased; a Great Kangaroo (*Macropus giganteus*), a Red Kangaroo (*Macropus rufus*), born in the Gardens.

ANNIVERSARY ADDRESS OF THE PRESIDENT OF THE ROYAL GEOLOGICAL SOCIETY, JOHN EVANS, F.R.S.¹

II.

MR. EVANS, in continuing his address, spoke of stratigraphical geology and of palæontology, expressing his belief that all recent discoveries pointed to uninterrupted continuity in both regions. After briefly referring to the evidence found in Settle Cave of the pre-Glacial existence of man in this country, and to the Wealden boring, Mr. Evans spoke as follows:—

There is only one more subject on which I will say a few words, and which, as to some slight extent involving a question in which I am personally interested, I have kept for the end of my address.

It is one to which it appears probable that the earnest attention of geologists will immediately be called, namely, the water-supply of this vast metropolis. This is, indeed, not the first time that the attention of this Society has been called to it; for Professor Prestwich devoted to it a considerable portion of his presidential address in 1872. It has since been more fully discussed in the Sixth Report of the Commissioners appointed in 1868 to inquire into the best means of preventing the pollution of rivers, who have extended their inquiries somewhat beyond

¹ Continued from p. 356.